

**FINAL REPORT**  
**May 2008**

**REPORT NO. 07-13**



**METAL TOP ADAPTER ACV0000807, MANUFACTURED BY  
DELFASCO, INC. FOR ALLIANT TECHSYSTEMS, INC.,  
FOR PA116 CONTAINERS ON A 44" x 40" WOOD PALLET  
FIRST ARTICLE TESTS (FATs) IAW MIL-STD-1660,  
"DESIGN CRITERIA FOR AMMUNITION UNIT LOADS"**

Prepared for:

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Distribution Unlimited



**DEFENSE AMMUNITION CENTER  
VALIDATION ENGINEERING DIVISION  
MCALESTER, OKLAHOMA 74501-9053**

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**METAL TOP ADAPTER ACV0000807  
MANUFACTURED BY DELFASCO, INC. FOR  
ALLIANT TECHSYSTEMS, INC. FOR PA116  
CONTAINERS ON A 44" x 40" WOOD PALLET,  
FIRST ARTICLE TESTS (FATs) IAW MIL-STD-1660,  
"DESIGN CRITERIA FOR AMMUNITION UNIT LOADS"**

**ABSTRACT**


The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SJMAG-DEV) conducted First Article Tests (FATs) IAW MIL-STD-1660, "Design Criteria for Ammunition Unit Loads" on the metal top adapter ACV0000807 manufactured by Delfasco, Inc. of Afton, Tennessee, for Alliant Techsystems, Inc. of Plymouth, Michigan for PA116 containers on a 44" x 40" wood pallet. Two (2) test units were tested with a load of 2,495 lbs each. The tests accomplished on the test units were the Stacking, Repetitive Shock, Drop, Incline-Impact, Sling Compatibility, Forklifting, and Disassembly Tests. The test units passed all requirements with no significant problems encountered. As a result of the performance of the test units during testing, the metal top adapter ACV0000807 manufactured by Delfasco, Incorporated of Afton, Tennessee, for Alliant Techsystems, Inc. of Plymouth, Michigan for PA116 containers on a 44" x 40" wood pallet, is recommended for use by the United States Army.

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**U.S. ARMY DEFENSE AMMUNITION CENTER  
VALIDATION ENGINEERING DIVISION  
MCALESTER, OK 74501-9053**

**REPORT NO. 07-13**

**METAL TOP ADAPTER ACV0000807 MANUFACTURED BY DELFASCO, INC.  
FOR ALLIANT TECHSYSTEMS, INC., FOR PA116 CONTAINERS  
ON A 44" x 40" WOOD PALLET, FIRST ARTICLE TESTS (FATs)  
IAW MIL-STD-1660, "DESIGN CRITERIA FOR AMMUNITION UNIT LOADS"**

**TABLE OF CONTENTS**

PART	PAGE NO.
1. INTRODUCTION .....	1-1
A. BACKGROUND .....	1-1
B. AUTHORITY .....	1-1
C. OBJECTIVE .....	1-1
D. CONCLUSION .....	1-1
2. ATTENDEES .....	2-1
3. TEST PROCEDURES .....	3-1
4. TEST EQUIPMENT .....	4-1
5. TEST RESULTS .....	5-1
6. DRAWINGS.....	6-1



## **PART 1 – INTRODUCTION**

**A. BACKGROUND**. The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SJMAC-DEV) conducted First Article Tests (FATs) IAW MIL-STD-1660, "Design Criteria for Ammunition Unit Loads" on the metal top adapter ACV0000807 manufactured by Delfasco, Inc. of Afton, Tennessee, for Alliant Techsystems, Inc. of Plymouth, Michigan for PA116 containers on a 44" x 40" wood pallet. Two test (2) units were tested with a load of 2,495 lbs each. The tests accomplished on the test units were the Stacking, Repetitive Shock, Drop, Incline-impact, Sling Compatibility, Forklifting, and Disassembly Tests. The unitization procedures were provided by DAC, Transportation Engineering Division (SJMAC-DET).

**B. AUTHORITY**. This test was conducted IAW mission responsibilities delegated by the U.S. Army Joint Munitions Command (JMC), Rock Island, IL. Reference is made to the following:

1. AR 740-1, 9 September 2002, Storage and Supply Activity Operation.
2. JMC-R, 10-23, Mission and Major Functions of U.S. Army Defense Ammunition Center (DAC) 12 April, 2007.

**C. OBJECTIVE**. The objective of the tests was to determine if the metal top adapter ACV0000807 for PA116 containers on a 44" x 40" wood pallet met the MIL-STD-1660 test requirements prior to the acceptance of the unitization procedures by the U.S. Army.

**D. CONCLUSION.** The test units passed all requirements with no significant problems encountered. As a result of the performance of the test units, the metal top adapter ACV0000807 manufactured by Delfasco, Incorporated of Afton, Tennessee, for Alliant Techsystems, Inc. of Plymouth, Michigan, for PA116 containers on a 44" x 40" wood pallet is recommended for use by the United States Army.

## **PART 2 - ATTENDEES**

### **DATE PERFORMED:**

Test Unit #1- March 18-19, 2008

Test Unit #2- March 19-20, 2008

### **ATTENDEE**

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### **PART 3 - TEST PROCEDURES**

**A. MIL-STD-1660 TEST.** The test procedures outlined in this section from were extracted from the MIL-STD-1660. The tests are conducted on ammunition pallet units or unit loads and are summarized as follows:

**1. STACKING TEST.** The test unit will be tested to simulate a stack of identical items stacked 16 feet high, for a period of one hour. This stacking load will be simulated by subjecting the specimen to a compression weight equal to an equivalent 16-foot stacking height. Photo 1 below shows an example of a unit load in the compression tester.



**Photo 1. Example of Stacking Test.**  
**(2.75-inch Hydra 70, PA151 Rocket Pallet in the Stacking Test.)**

**2. REPETITIVE SHOCK TEST.** The repetitive shock test is conducted IAW Method 5019, Federal Standard 101. The test procedure is as follows: The test unit will be placed on (not fastened to) the platform. With the test unit in one position, the platform will be vibrated at ½-inch amplitude (1-inch double amplitude) starting at a frequency of approximately 3 cycles-per-



second. The frequency will be steadily increased until the specimen leaves the platform. The resonant frequency is achieved when a 1/16-inch-thick feeler gage momentarily slides freely between every point on the specimen in contact with the platform at some instance during the cycle. Midway into the testing period, the specimen will be rotated 90 degrees, and the test continued for the duration. Unless failure occurs, the total time of vibration will be three hours. Photo 2 shows an example of the repetitive shock test.



**Photo 2. Example of the Repetitive Shock Test.  
(MSTF Low)**

**3. EDGEWISE-ROTATIONAL DROP TEST.** This test is conducted using the procedures of Method 5008, Federal Standard 101. The procedure for the Edgewise-Rotational Drop Test is as follows: The test unit will be placed on its skids with one end of the pallet supported on a beam 6 inches high. The height of the beam will be increased as necessary to ensure that there is no support for the skids between the ends of the specimen when the dropping takes place, but should not be high enough to cause the specimen to slide on the supports when the dropped end is raised for the drop. The unsupported end of the specimen is then raised and allowed to fall freely to the concrete, pavement, or similar unyielding surface from a prescribed height. Unless otherwise specified, the height of drop for level A protection will conform to the following tabulation:

GROSS WEIGHT (WITHIN RANGE LIMITS) (Pounds)	DIMENSIONS OF ANY EDGE, HEIGHT OR WIDTH (WITHIN RANGE LIMITS) (Inches)	HEIGHT OF DROPS ON EDGES	
		Level A (Inches)	Level B (Inches)
150-250	60-66	36	27
250-400	66-72	32	24
400-600	72-80	28	21
600-1,000	80-95	24	18
1,000-1,500	95-114	20	16
1,500-2,000	114-144	17	14
2,000-3,000	Above 145- No limited	15	12
Above – 3,000		12	9

Figure 1.



Photo 3. Example of Edgewise-Rotational Drop Test  
(MSTF Low)

**4. INCLINE-IMPACT TEST.** This test is conducted by using the procedure of Method 5023, Incline-Impact Test of Federal Standard 101. The procedure for the incline-impact test is as follows: The test unit will be placed on the carriage with the surface or edge to be impacted projecting at least 2 inches beyond the



front end of the carriage. The carriage will be brought to a predetermined position on the incline and released. If it were desired to concentrate the impact on any particular position on the container, a 4- x 4-inch timber may be attached to the bumper in the desired position before the test. The carriage will not strike any part of the timber. The position of the specimen on the carriage and the sequence in which surfaces and edges are subjected to impacts may be at the option of the testing activity and dependent upon the objective of the test. When the test is to determine satisfactory requirements for a container or pack, and, unless otherwise specified, the specimen will be subjected to one impact on each surface that has each dimension less than 9.5 feet. Unless otherwise specified, the velocity at the time of the impact will be 7 feet-per-second. Photo 4 shows an example of this test.



**Photo 4. Example of the Incline-Impact Test.**  
**(2.75-Inch, Hydra 70, PA151 Rocket Pallet on incline-impact tester.)**

**5. SLING COMPATIBILITY TEST.** The test unit utilizing special design or non-standard pallets will be lifted, swung, lowered and otherwise handled as necessary, using slings of the types normally used for handling the unit loads under consideration. Slings will be easily attached and removed. Danger of slippage or disengagement when load is suspended will be cause for rejection of

the specimen.

**6. FORKLIFTING TESTS.** The test unit will be lifted clear of the ground by a forklift from the end of the test unit and transported on the forks in the level or back-tilt position. The forklift will pass over the Optional Rough Handling Course for Forklift Trucks as outlined in MIL-STD-1660. The course will consist of parallel pairs of 1-inch boards spaced 54 inches apart and will be laid flat wise on the pavement across the path of the forklift. One pair will be laid at an angle of approximately 60 degrees to the path so that the left wheel strikes first. Another pair will be laid securely across the path of the forklift so that the wheels strike simultaneously. Another pair will be laid at an angle of approximately 75 degrees to the path so that the right wheel strikes first. The test unit will be transported over the Optional Rough Handling Course. The test unit shall be observed for deflection and damage. The test unit will be rotated 90 degrees and the test unit lifted from the side and the above steps repeated.

**7. DISASSEMBLY TEST.** Following all rough handling tests the test unit may be squared up within 2 inches of its original shape and on a flat level surface. The strapping will then be cut and removed from the palletized load. Assembly of the test unit will be such that it retains its unity upon removal of the strapping.



## **PART 4 - TEST EQUIPMENT**

### **A. COMPRESSION TESTER.**

- |                       |                      |
|-----------------------|----------------------|
| 1. Manufacturer:      | Ormond Manufacturing |
| 2. Platform:          | 60- x 60-inches      |
| 3. Compression Limit: | 50,000 pounds        |
| 4. Tension Limit:     | 50,000 pounds        |

### **B. TRANSPORTATION SIMULATOR.**

- |                  |                     |
|------------------|---------------------|
| 1. Manufacturer: | Gaynes Laboratory   |
| 2. Capacity:     | 6,000-pound payload |
| 3. Displacement: | 1/2-inch amplitude  |
| 4. Speed:        | 50 to 400 RPM       |
| 5. Platform:     | 5- x 8-foot         |

### **C. INCLINED PLANE.**

- |                  |                    |
|------------------|--------------------|
| 1. Manufacturer: | Conbur Incline     |
| 2. Type:         | Impact Tester      |
| 3. Grade:        | 10 percent incline |
| 4. Length:       | 12-foot            |

## **PART 5 - TEST RESULTS**

- 5.1. **TEST UNIT DATA.** The test unit was inertly loaded to the specified design weight using inert materials. The test unit was prepared using the unitization procedures specified in Part 6 – Drawings. Special care was taken to ensure that each PA116 container had the proper amount of weight in order to achieve a realistic pallet center of gravity (CG). Once properly prepared, Test Units #1 and #2 were tested using MIL-STD-1660 requirements.

### **TEST UNIT #1:**

Test Date:	18-19 March 2008	<u>Pallet inertly loaded with:</u>
Weight:	2,495 pounds	30 PA116 containers
Length:	44 1/2 inches	loaded to 75 pounds
Width:	40 1/8 inches	with inert material
Height:	52 5/8 inches	

### **TEST UNIT #2:**

Test Date:	19-20 March 2008	<u>Pallet inertly loaded with:</u>
Weight:	2,495 pounds	30 PA116 containers
Length:	44 1/2 inches	loaded to 75 pounds
Width:	40 1/8 inches	with inert material
Height:	52 5/8 inches	



Photo 5. Photo of Test Unit #1.

A. MIL-STD-1660 TEST RESULTS - TEST UNIT #1:

1. STACKING TEST. The test unit was compressed with a load force of 7,485 pounds for 60 minutes on 18 March 2008. No damage was noted as a result of this test. See Photo 6 of the test unit in the compression unit.



Photo 6. Test Unit #1 in the Stacking Test.

2. REPETITIVE SHOCK TEST. The test unit was vibrated 90 minutes at 215 RPM in the longitudinal orientation and 90 minutes at 200 RPM in the lateral

orientation on 18 March 2008. No damage was noted as a result of this test. Photo 7 shows the test unit on the vibration platform.



**Photo 7. Test Unit #1 During Repetitive Shock Testing.**

3. **EDGEWISE-ROTATIONAL DROP TEST.** The test unit was edgewise-rotationally dropped from a height of 15 inches on both longitudinal sides and both lateral sides. No significant damage was noted as a result of this test. Photo 8 shows the test unit during the Edgewise-Rotational Drop Test.



**Photo 8. Edgewise Drop Test on the Test Unit #1.**

4. **INCLINE-IMPACT TEST.** The test unit was impact tested on both longitudinal sides and both lateral sides. No significant damage was noted as a



result of this test. See Photo 9 for the test unit during the lateral incline-impact test.



**Photo 9. Incline-Impact Testing of the Test Unit #1.**

**5. SLING COMPATIBILITY TEST.** Test Unit #1 was sling compatibility tested by slinging the container with lifting cables through the lifting rings on the top assembly by four, three, two, and one points. No problems were encountered during the lifts. See Photo 10 for the test setup during the Sling Compatibility Test.



**Photo 10. One Point Sling Compatibility Testing of the Test Unit #1.**

6. **FORKLIFTING TEST.** On 19 March 2008 Test Unit #1 was lifted from the end of the pallet on the forks of the forklift truck and carried over the Hazard Course three times with no damage or instability noted. The test unit was lifted from the adjacent side of the pallet and the above steps accomplished with no problems encountered. See Photo 11 for the test setup during the Forklifting Test.



Photo 11. Forklift Testing of the Test Unit #1.

7. **DISASSEMBLY TEST.** Inspection revealed no damage.

8. **CONCLUSION.** No major problems were encountered during the completion of the required testing. The test unit passed the requirements of MIL-STD-1660.

**B. MIL-STD-1660 TEST RESULTS TEST UNIT#2:**

1. **STACKING TEST.** The test unit was compressed with a load force of 2,495 pounds for 60 minutes on 19 March 2008. No damage was noted as a result of this test.

2. **REPETITIVE SHOCK TEST.** The test unit was vibrated 90 minutes at 215 RPM in the longitudinal orientation and 90 minutes at 200 RPM in the lateral orientation on 19 March 2008. No damage was noted as a result of this test.

3. **EDGEWISE-ROTATIONAL DROP TEST.** The test unit was edgewise-rotationally dropped from a height of 15 inches on both longitudinal sides and both lateral sides. No significant damage was noted as a result of this test,

4. **INCLINE-IMPACT TEST.** The test unit was impact tested on both longitudinal sides and both lateral sides. No significant damage was noted as a result of this test.

5. **SLING COMPATIBILITY TEST.** Test Unit #2 was sling compatibility tested by slinging the container with lifting cables through the lifting rings on the top assembly by four, three, two and one points. No problems were encountered during the lifts.

6. **FORKLIFTING TEST.** On 20 March 2008 Test Unit #2 was lifted from the end of the pallet on the forks of the forklift truck and carried over the Hazard Course three times with no damage or instability noted. The test unit was lifted from the adjacent side of the pallet and the above steps accomplished with no problems encountered.

7. **DISASSEMBLY TEST.** Inspection revealed no damage.

8. **CONCLUSION.** No major problems were encountered during the completion of the required testing. The test unit passed the requirements of MIL-STD-1660.

## **PART 6– DRAWINGS**

The following test sketches represent the load configuration that was subjected to the test criteria.



## APPENDIX 7B

# UNITIZATION PROCEDURES FOR COMPLETE ROUNDS PACKED IN CYLINDRICAL METAL CONTAINERS ON 4-WAY ENTRY PALLETS\*

## PA116 & PA171 SERIES CONTAINER

### INDEX

<u>ITEM</u>	<u>PAGE(S)</u>
PALLET UNIT DATA - - - - -	2
GENERAL NOTES - - - - -	3
PALLET UNIT DETAIL - - - - -	4
DUNNAGE DETAILS - - - - -	5
FILLERS AND FILLER ASSEMBLY INSTALLATION DETAILS - - - - -	5-6

**NOTICE: THIS APPENDIX CANNOT STAND ALONE BUT MUST BE USED IN CONJUNCTION WITH THE BASIC UNITIZATION PROCEDURES DRAWING 19-48-4079-20PM1002.**

#### DISTRIBUTION STATEMENT A:

APPROVED FOR PUBLIC RELEASE;  
DISTRIBUTION IS UNLIMITED.

\* SEE GENERAL NOTE "K" ON PAGE 3.

### U.S. ARMY MATERIEL COMMAND DRAWING

APPROVED, U.S. ARMY ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING COMMAND <i>David C. Puckett</i> AMSJD-AAR-AIL-TP(R)		<b>CAUTION: VERIFY PRIOR TO USE AT WWW.DAC.ARMY.MIL/DET THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 6.</b>	
APPROVED, U.S. ARMY JOINT MUNITIONS COMMAND <i>[Signature]</i> AMSJM-LIT		<b>DO NOT SCALE</b>	
APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND <i>[Signature]</i> U.S. ARMY DEFENSE AMMUNITION CENTER		<b>NOVEMBER 1987</b>	
ENGINEER OR TECHNICIAN		REVISION NO. 6	
BASIC REV.		JULY 2006	
TRANSPORTATION ENGINEERING DIVISION		SEE THE REVISION LISTING ON PAGE 2	
VALIDATION ENGINEERING DIVISION		CLASS	
ENGINEERING DIRECTORATE		DIVISION	
		DRAWING	
		FILE	
		19	
		48	
		4079/ 7B	
		20PM1002	

PROJECT FSA 63/7B-66

PALLET UNIT DATA				
ITEMS INCLUDED		HAZARD CLASS AND DIVISION	COMPAT-IBILITY GROUP	APPROX WEIGHT LBS
NSN	DODIC			
1315-				
01-250-8636	C784	1. 2. 1	C	2, 408
01-369-6612	C784	1. 2. 1	C	2, 408
01-242-4796	C785	1. 2. 1	C	2, 078
01-288-5545	C785	1. 2. 1	C	2, 078
01-509-3555	CA31	1. 3	C	2, 288

● HAZARD CLASSIFICATION DATA CONTAINED IN THE ABOVE CHART IS FOR GUIDANCE AND INFORMATIONAL PURPOSES ONLY. VERIFICATION OF THE SPECIFIED DATA SHOULD BE MADE BY CONSULTING THE MOST RECENT JOINT HAZARD CLASSIFICATION SYSTEM LISTING OR OTHER APPROVED LISTING(S).

### REVISIONS

REVISION NO. 1, DATED MARCH 1989, CONSISTS OF:

1. CHANGING THE QD CLASSES IN THE "PALLET UNIT DATA" CHART.
2. ADDING GENERAL NOTE "N" (PRESERVATIVE TREATMENT).
3. ADDING ITEM BY NATIONAL STOCK NUMBER TO THE "PALLET UNIT DATA" CHART.

REVISION NO. 2, DATED MAY 1994, CONSISTS OF:

CHANGING DRAWING IN ACCORDANCE WITH ECP M3K3014.

REVISION NO. 3, DATED APRIL 1996, CONSISTS OF:

CHANGING DRAWING IN ACCORDANCE WITH ECP M4T3006 AND ECP M3T4321.

REVISION NO. 4, DATED OCTOBER 1998, CONSISTS OF:

1. CHANGING DRAWING IN ACCORDANCE WITH ECP R7T9211.
2. REMOVING GENERAL NOTE RELATING TO STRAP CUTTER AND RELETTERING THE REMAINING NOTES.

REVISION NO. 5, DATED MARCH 2003, CONSISTS OF:

1. CHANGING DRAWING IN ACCORDANCE WITH ECP R2T5303.
2. UPDATING DRAWING FORMAT.

REVISION NO. 6, DATED JULY 2006, CONSISTS OF:

CHANGING DRAWING IN ACCORDANCE WITH ECP R05T5076.



(GENERAL NOTES CONTINUED)

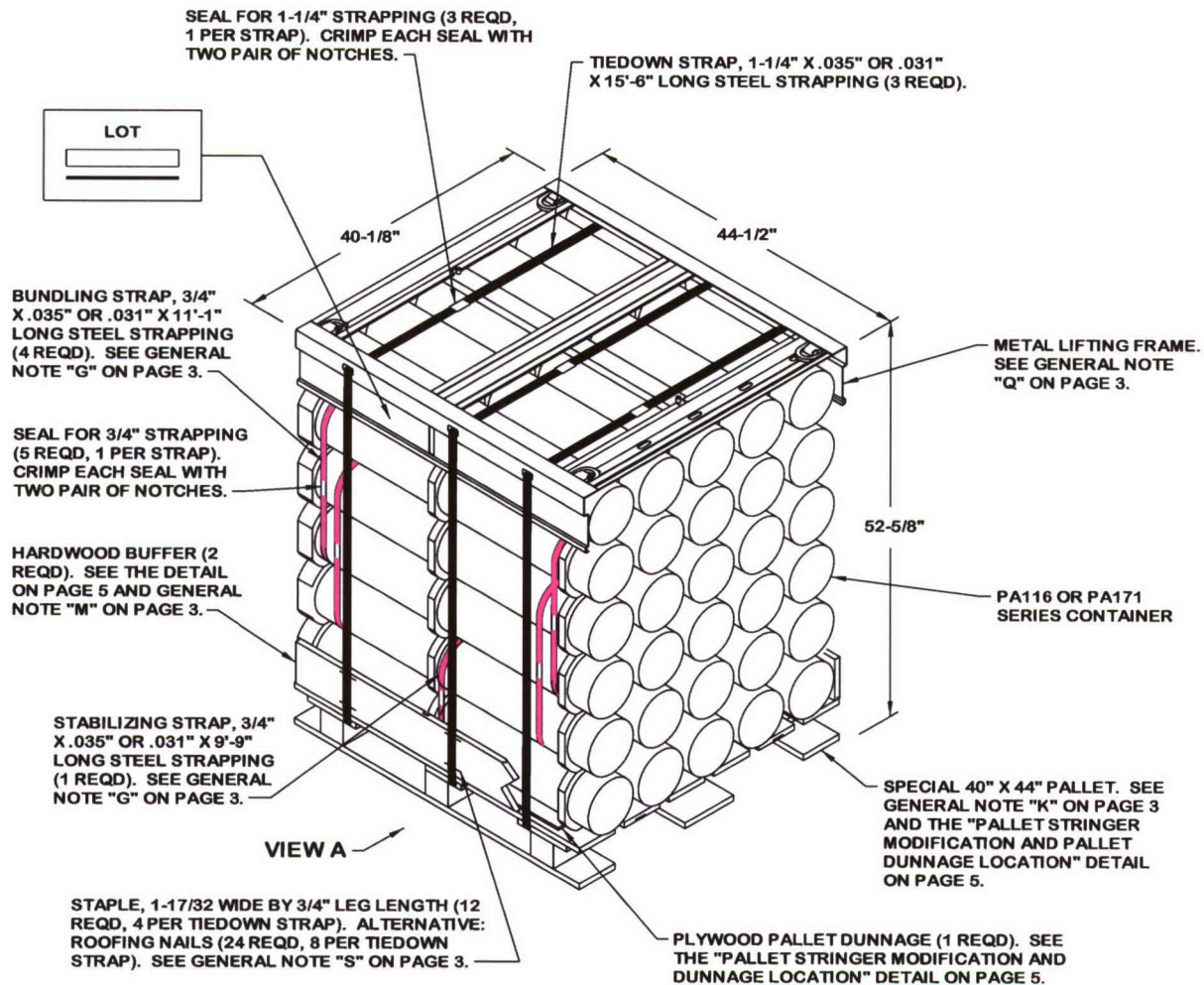
- M. THE HARDWOOD BUFFER PIECES DEPICTED IN THE UNIT LOAD ON PAGE 4 WILL BE NOMINAL 1" X 6" LUMBER IAW ASTM D6199, CLASS 2, GROUP V. THE THICKNESS OF THE HARDWOOD BUFFER PIECES MUST BE ADJUSTED, AS REQUIRED, TO COMPLY WITH THE DIMENSIONAL VARIANCE OF THE PA116 OR PA171 CONTAINERS, SO AS TO COMPLETELY FILL OUT THE PALLET. THE LENGTH DIMENSION OF THE PALLET UNIT AT THE HARDWOOD BUFFER PIECES MUST BE WITHIN THE TOLERANCE OF PLUS 1/4", MINUS 0" OF THE LENGTH DIMENSION AT THE TOP OF THE PALLET UNIT.
- N. ALL DUNNAGE SHALL BE PRESERVATIVE TREATED IN ACCORDANCE WITH GENERAL NOTE "X" IN THE BASIC PROCEDURES.
- O. TWO METHODS MAY BE USED TO IMPROVE PALLET PERFORMANCE DURING MULTIPLE HANDLINGS IN THE REUSE PROGRAM, IF SO DESIRED. FIRST METHOD: COMMERCIALY AVAILABLE TRUSS-NAIL PLATES MAY BE ADDED TO THE SIX OUTSIDE POSTS OF THE PALLET. SECOND METHOD: FOUR 3-1/4" NAILS MAY BE USED IN EACH POST IN A BOX SHAPED PATTERN IN LIEU OF THE THREE 3-1/4" NAILS IN A STAGGERED PATTERN CURRENTLY SPECIFIED IN MIL-P-15011.
- P. HEAT TREATMENT IS REQUIRED IN ACCORDANCE WITH THE BASIC UNITIZATION PROCEDURES DRAWING 19-48-4079-20PM1002 FOR ALL NEW PALLETS/NON-MANUFACTURED BUFFER BOARD PROCUREMENTS. FOR EXISTING REUSED PALLETS AND HARDWOOD BUFFER BOARDS THE NONCONIFEROUS (NC-US) MARKING IS REQUIRED IN LIEU OF THE HEAT TREATMENT MARKING. THE NC-US MARKING SHALL BE INDELIBLE, BLACK, AND APPROXIMATELY ONE INCH HIGH, APPROPRIATE WIDTH AND LEGIBLE. SEE PAGE 5 FOR THE ALTERNATIVE PALLET MARKING LOCATIONS TO BE USED IF THE PALLET POSTS CANNOT BE MARKED.
- Q. FOR DETAILS OF THE METAL LIFTING FRAME, SEE DAC DRAWING AC200000807 AND MILITARY SPECIFICATION MIL-A-70788.
- R. WHEN TWO OR MORE LAYERS ARE OMITTED, THE BUNDLING STRAP REQUIREMENTS WILL CHANGE. A FOUR LAYER UNIT WILL HAVE TWO BUNDLING STRAPS OMITTED. THE REMAINING BUNDLING STRAPS WILL SURROUND THE SECOND THROUGH THE FOURTH LAYERS. A UNIT WITH THREE OR LESS LAYERS DOES NOT REQUIRE BUNDLING STRAPS. THERE WILL BE NO CHANGE ON THE STABILIZING STRAP REQUIREMENT.
- S. ROOFING NAILS IAW ASTM F1667 NL RF S S-02Z OR NL RF S Q-02Z MAY BE USED AS AN ALTERNATIVE TO STAPLES FOR SECURING THE STEEL STRAPS TO THE BUFFER PIECES. NAILS MUST BE APPLIED NEXT TO THE STRAPPING SUCH THAT THE NAIL HEADS OVERLAP THE STRAPPING. APPLY 12 NAILS (FOUR PER STRAP) TO EACH BUFFER PIECE IN PAIRS ON EITHER SIDE OF THE STRAP WITH THE SECOND NAIL APPLIED APPROXIMATELY 180 DEGREES FROM THE FIRST NAIL.

GENERAL NOTES

- A. THIS APPENDIX CANNOT STAND ALONE BUT MUST BE USED IN CONJUNCTION WITH THE BASIC UNITIZATION PROCEDURES DRAWING 19-48-4079-20PM1002. TO PRODUCE AN APPROVED UNIT LOAD, ALL PERTINENT PROCEDURES, SPECIFICATIONS AND CRITERIA SET FORTH WITHIN THE BASIC DRAWING WILL APPLY TO THE PROCEDURES DELINEATED IN THIS APPENDIX. ANY EXCEPTIONS TO THE BASIC PROCEDURES ARE SPECIFIED IN THIS APPENDIX.
- B. DIMENSIONS, CUBE AND WEIGHT OF A PALLET UNIT WILL VARY SLIGHTLY DEPENDING UPON THE ACTUAL DIMENSIONS OF THE BOXES AND THE WEIGHT OF THE SPECIFIC ITEM BEING UNITIZED.
- C. THE FOLLOWING AMC DRAWINGS ARE APPLICABLE FOR OUTLOADING AND STORAGE OF THE ITEMS COVERED BY THIS APPENDIX.
- |                  |         |                                   |
|------------------|---------|-----------------------------------|
| CARLOADING       | - - - - | 19-48-4212/8B-5PM1003             |
| TRUCKLOADING     | - - - - | 19-48-4213/8B-11PM1003            |
| STORAGE          | - - - - | 19-48-4145/8B-1-2-3-4-14-22PM1003 |
| END OPENING ISO  |         |                                   |
| CONTAINER        | - - - - | 19-48-4215/8B-15PM1013            |
| MILVAN           | - - - - | 19-48-4214/8B-15PM1006            |
| SIDE OPENING ISO |         |                                   |
| CONTAINER        | - - - - | 19-48-4265/8B-15PM1014            |
- D. IF ITEMS COVERED HEREIN ARE UNITIZED PRIOR TO ISSUANCE OF THIS REVISION TO THIS APPENDIX, THE CONTAINERS NEED NOT BE REUNITIZED SOLELY TO CONFORM TO THIS REVISION.
- E. FOR DETAILS OF THE PA116 OR PA171 CONTAINER SEE ARDEC DRAWING 9386831 OR 12990755, RESPECTIVELY.
- |                |           |  |
|----------------|-----------|--|
| DIMENSIONS     | - -       | 44-1/2" LONG X 7-3/4" WIDE X 7-3/4" HIGH |
| CUBE           | - - - - - | 1.5 CUBIC FEET (APPROX)                  |
| WEIGHT W/ROUND | - - - - - | 64, 71 OR 75 POUNDS (APPROX)             |
| WEIGHT EMPTY   | - - - - - | 23 POUNDS (APPROX)                       |
- F. THE UNITIZATION PROCEDURES DEPICTED HEREIN MAY ALSO BE USED FOR UNITIZING COMPLETE ROUNDS WHEN IDENTIFIED BY DIFFERENT NATIONAL STOCK NUMBERS (NSN) THAN WHAT IS SHOWN ON PAGE 2, PROVIDED THE CONTAINER PACK DOES NOT VARY FROM WHAT IS DELINEATED HEREIN. THE EXPLOSIVE CLASSIFICATION OF OTHER ITEMS MAY BE DIFFERENT THAN WHAT IS SHOWN.
- G. BUNDLING STRAPS AND STABILIZING STRAP MUST BE TENSIONED AND SEALED PRIOR TO THE APPLICATION OF THE TIEDOWN STRAPS. INSTALL AS CLOSE TO THE OUTER CONTAINER RINGS AS POSSIBLE, TO AVOID DAMAGE TO THE CONTAINER. CAUTION: STRAPS MUST NOT BE ALLOWED TO OVERLAP. DO NOT PLACE ANY STRAP OVER THE IM BLOWOUT PANELS OF THE PA171 SERIES CONTAINERS.
- H. FULL IDENTIFICATION MARKINGS IN ACCORDANCE WITH DAC DRAWING ACV00561, TO INCLUDE NSN AND DODIC, QUANTITY AND NOMENCLATURE, LOT NUMBER AND GROSS WEIGHT OF THE LOAD, SHALL BE MARKED ON TAGS LOCATED ON OPPOSITE UPPER CORNERS OF THE LOAD. BAR CODE LABELS ARE REQUIRED ON THE STRAPS OF OPPOSITE CORNERS, SEE DAC DRAWING ACV00561.
- J. THE AMMUNITION LOT NUMBER MARKING SHALL BE PLACED IN THE AREA INDICATED IN THE ISOMETRIC VIEW ON PAGE 4, FOR THE M865 AND M831A1 CARTRIDGES ONLY, IN 1/2" HIGH UNDERLINED LETTERS.
- K. THE SPECIAL PALLET WILL BE CONSTRUCTED AND ASSEMBLED IN ACCORDANCE WITH A MILITARY SPECIFICATION MIL-P-15011, STYLE 1, TYPE I, CLASS 1 PALLET WITH THE FOLLOWING EXCEPTIONS. THE TOP AND BOTTOM DECK BOARDS WILL BE 44" LONG INSTEAD OF 48". IN ORDER TO PROVIDE ADDITIONAL SUPPORT FOR THE STEEL BANDS, THE TWO OUTSIDE 1" X 8" STRINGER BOARDS ON THE MODIFIED PALLET SHALL BE POSITIONED AS SHOWN IN THE DETAIL ON PAGE 5, AND THE CENTER STRINGER BOARD ON THE MODIFIED PALLET SHALL BE REPLACED WITH A 1" X 6" AS SHOWN IN THE DETAIL ON PAGE 5. THE MODIFIED STYLE 1 PALLET ALSO NEED NOT HAVE CHAMFERS OR STRAP SLOTS AS SPECIFIED WITHIN MILITARY SPECIFICATION MIL-P-15011 WHEN USED FOR THE UNITIZATION OF ITEMS COVERED BY THIS APPENDIX. ALL OTHER REQUIREMENTS SPECIFIED WITHIN MIL-P-15011 FOR A STYLE 1, TYPE I, CLASS 1 PALLET WILL APPLY TO THE PALLET SPECIFIED WITHIN THIS DRAWING.
- L. ALTHOUGH THE CONTAINERS DEPICTED IN THE UNIT LOAD ON PAGE 4 ARE CONSTRUCTED WITH INTERLOCKING DEVICES, THE INTERLOCKS WILL NOT FUNCTION PROPERLY UNLESS THE CONTAINERS ARE POSITIONED SO THAT THE "PINS" OF THE INTERLOCKS ARE FACING UPWARD. THIS ORIENTATION WILL AID IN THE PREVENTION OF CONTAINER MOVEMENT, BOTH LATEROALLY AND LONGITUDINALLY, DURING SHIPMENT OF THE UNIT LOAD.

(CONTINUED AT LEFT)



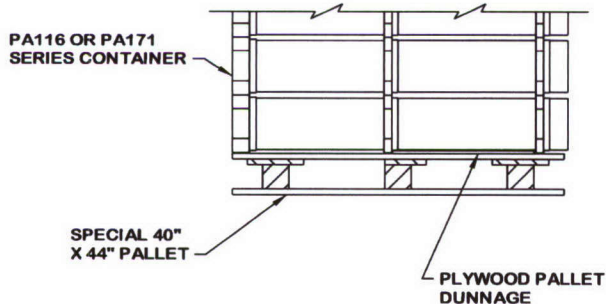


**ISOMETRIC VIEW**

**UNIT DATA**

PA116 CONTAINER	- - 30 EACH @ 75 LBS	- - 2,250 LBS (APPROX)
DUNNAGE	- - - - -	81 LBS
PALLET	- - - - -	77 LBS

TOTAL WEIGHT	- - - - -	2,408 LBS (APPROX)
CUBE	- - - - -	54.4 CU FT (APPROX)



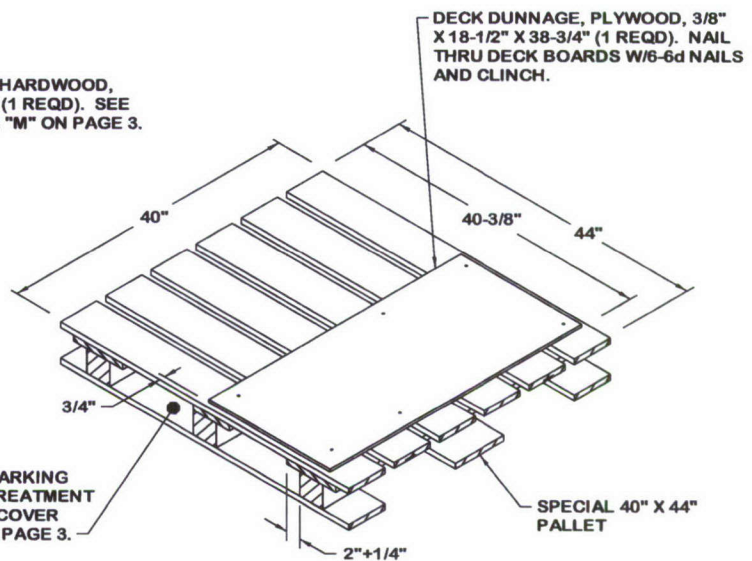
**PARTIAL VIEW A**

HARDWOOD BUFFER AND STRAPS HAVE BEEN OMITTED FOR CLARITY.

**BILL OF MATERIAL**

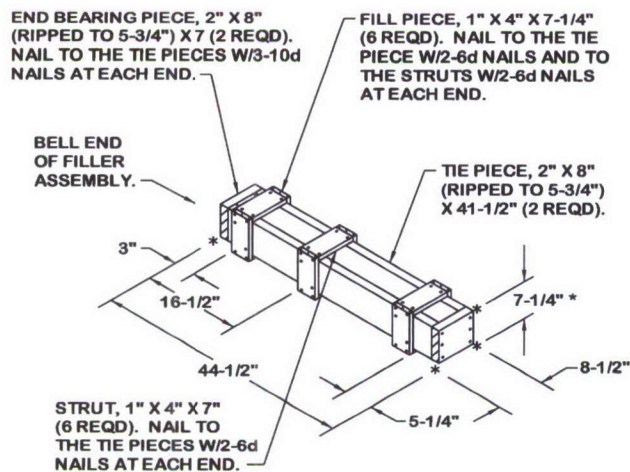
LUMBER	LINEAR FEET	BOARD FEET
1" X 6"	7.25	3.63
NAILS	NO. REQD	POUNDS
6d (2")	6	0.04
SPECIAL PALLET, 40" X 44"	- - - 1 REQD	- - - 77 LBS
STEEL STRAPPING, 3/4"	- - 54.08' REQD	- - 4.83 LBS
STEEL STRAPPING, 1-1/4"	- 46.50' REQD	- 6.64 LBS
SEAL FOR 3/4" STRAPPING	- - - 5 REQD	- - - NIL
SEAL FOR 1-1/4" STRAPPING	- - 3 REQD	- - - NIL
PLYWOOD, 3/8"	- - - 4.98 SQ FT REQD	- - 5.13 LBS
STAPLE, 1-17/32" X 3/4"	- - 12 REQD	- - - NIL
METAL LIFTING FRAME	- - - - 1 REQD	- - - 57 LBS





## **PALLET STRINGER MODIFICATION AND PALLET DUNNAGE LOCATION**

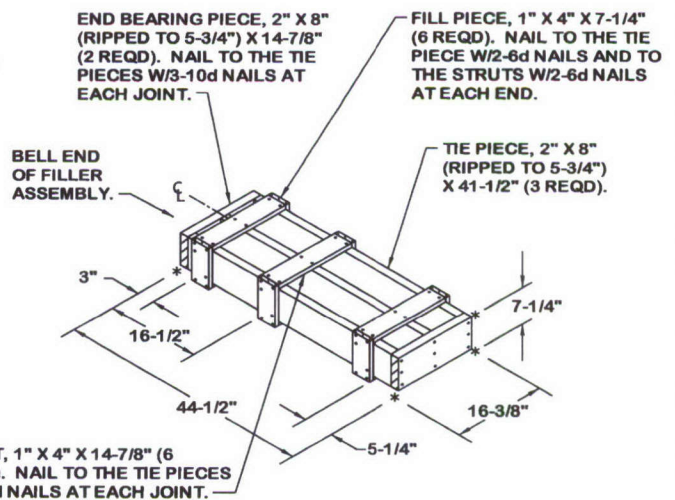
SEE GENERAL NOTE "K" ON PAGE 3.



## FILLER A

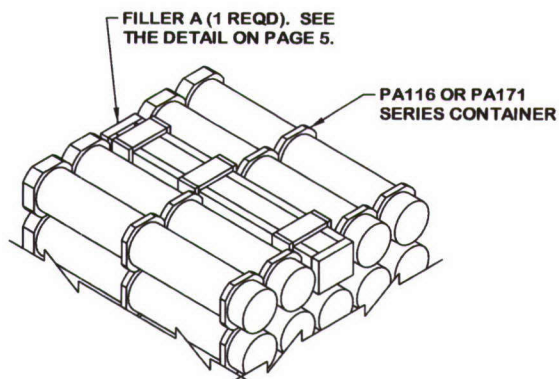
**THIS FILLER IS TO BE USED WHEN ONE CONTAINER IS TO BE OMITTED FROM A PALLET UNIT, OR IN COMBINATION WITH OTHER FILLER ASSEMBLIES.**

\* SEE SPECIAL NOTE 2 ON PAGE 6.



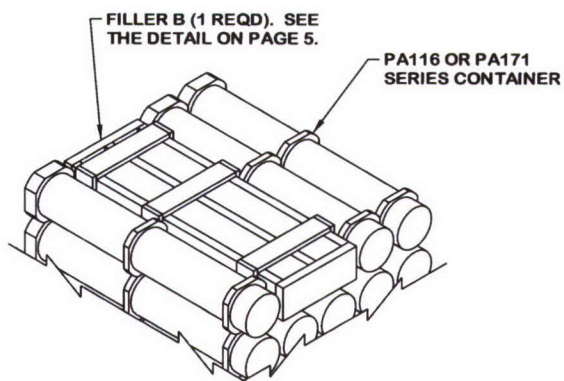
**FILLER B**

**THIS FILLER IS TO BE USED WHEN TWO CONTAINERS ARE TO BE OMITTED FROM A PALLET UNIT, OR IN COMBINATION WITH OTHER FILLER ASSEMBLIES.**



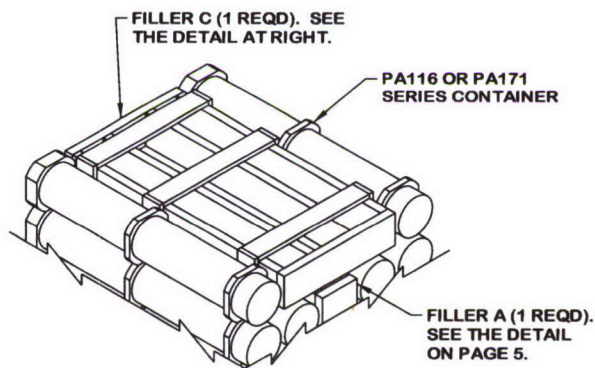
#### DETAIL A

THIS DETAIL DEPICTS PROCEDURES TO BE USED WHEN A STANDARD PALLET UNIT MINUS ONE CONTAINER IS TO BE UNITIZED. THE FILLER ASSEMBLY DEPICTED MUST BE INSTALLED IN THE MIDDLE OF THE TOP LAYER OF THE PALLET UNIT.



#### DETAIL B

THIS DETAIL DEPICTS PROCEDURES TO BE USED WHEN A STANDARD PALLET UNIT MINUS TWO CONTAINERS IS TO BE UNITIZED. THE FILLER ASSEMBLY DEPICTED MUST BE INSTALLED IN THE MIDDLE OF THE TOP LAYER OF THE PALLET UNIT.

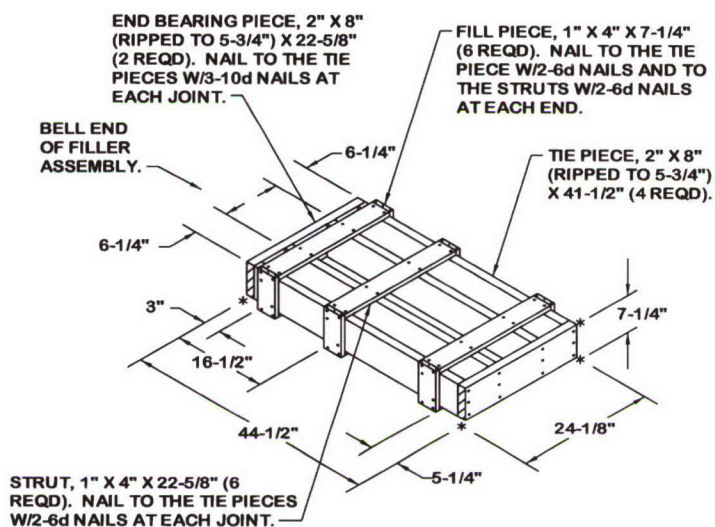


#### DETAIL C

THIS DETAIL DEPICTS PROCEDURES TO BE USED WHEN A STANDARD PALLET UNIT MINUS FOUR CONTAINERS IS TO BE UNITIZED. THE FILLER ASSEMBLIES DEPICTED MUST BE INSTALLED IN THE MIDDLE OF THE TOP LAYERS OF THE PALLET UNIT.

#### SPECIAL NOTES:

1. WHEN FIVE CONTAINERS ARE TO BE OMITTED FROM A PALLET UNIT, A COMPLETE LAYER OF CONTAINERS WILL BE OMITTED. WHEN FOUR CONTAINERS ARE TO BE OMITTED FROM A PALLET UNIT, A COMBINATION OF FILLER ASSEMBLIES DEPICTED ON PAGE 5 AND BELOW MUST BE USED. WHEN THREE OR LESS CONTAINERS ARE TO BE OMITTED FROM A PALLET UNIT, A COMBINATION OR ONE OF THE FILLER ASSEMBLIES DEPICTED ON PAGE 5 AND BELOW MUST BE USED. ALL FILLER ASSEMBLIES MUST BE INSTALLED IN THE MIDDLE OF THE TOP LAYER OR LAYERS OF A PALLET UNIT.
2. WHEN A "FILLER A" ASSEMBLY IS USED IN COMBINATION WITH A "FILLER B" OR "FILLER C" ASSEMBLY THE "FILLER A" ASSEMBLY MUST BE POSITIONED IN THE SECOND LAYER OF CONTAINERS FROM THE TOP OF THE PALLET UNIT AND MUST HAVE ITS OVERALL HEIGHT REDUCED FROM 7-1/4" TO 7" AND ALSO 2" X 6" MATERIAL WILL BE SUBSTITUTED FOR THE 2" X 8" (RIPPED TO 5-3/4") PIECES USED.
3. WHEN TWO "FILLER A" ASSEMBLIES ARE USED IN PLACE OF TWO OMITTED CONTAINERS, THE FILLER ASSEMBLIES WILL BE SEPARATED BY AT LEAST ONE CONTAINER TO INSURE PROPER FILLER ASSEMBLY RETENTION AND TO PRECLUDE ASSEMBLY INTERFERENCES.
4. WHEN TWO OR MORE LAYERS ARE OMITTED, THE BUNDLING STRAP REQUIREMENTS WILL CHANGE. SEE GENERAL NOTE "R" ON PAGE 3.



#### FILLER C

THIS FILLER IS TO BE USED WHEN THREE CONTAINERS ARE TO BE OMITTED FROM A PALLET UNIT, OR IN COMBINATION WITH OTHER FILLER ASSEMBLIES.